MegaEva/32

MULTI-COLOR

MULTI-SHADE

Graphics Display Adapter

Addendum

Congratulations on the purchase of your new Display Card. Your card is based on the new **Tseng ET4000/W32I**. The ET4000/W32i offers a 60% increase in speed performance of GUI applications when compared to its predecessor, the ET4000/W32, while offering full compatibility with the ET4000/W32 and ET4000.

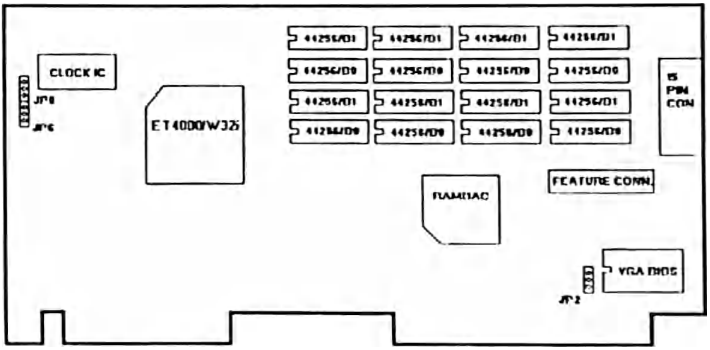
In addition to the speed improvement, your new ET4000/W32i Display Card offers the following modes which are not available with the previous ET4000/W32-based card.

*1024x768 - 64K colors in interlaced display (2MB video memory required)

Your Display Card may come with either 1MB or 2MB of video memory installed. Your ET4000/W32i-based card provides optimal speed performance with 2MB of video memory installed.

Display Card Layout

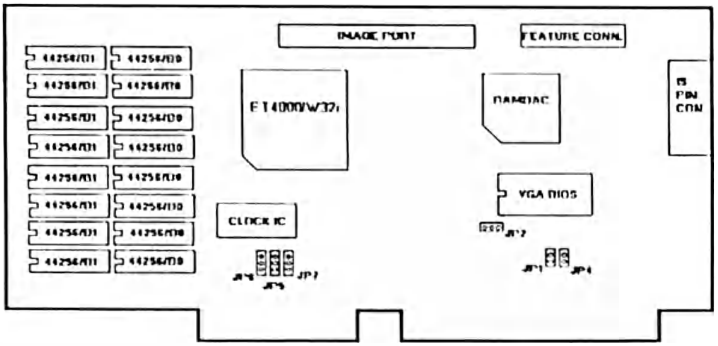
Display Card with 32-bit VESA Local Bus



Jumper settings

There are three jumpers on the VESA local bus display card, **JP2, JP5** and **JP6**. All of these jumpers are reserved for engineering purposes and are pre-set from the factory. Please do not change these jumpers before consulting with your supplier. JP2 is used for BIOS selection, as your display card comes with a 512K BIOS (two 256K BIOS). JP5 and JP6 are used for memory clock selection.

Display Card with 16-bit ISA bus



Jumper settings

JP1	0-Wait State
Installed	0-Wait enabled (default setting)
Open	0-Wait disabled

JP1 is a 2-pin jumper, used to maximize the bus speed of your Display Card. Bus timings on computer motherboards vary. JP1 should be disconnected if you find that your Display Card is not compatible with your PC motherboard when JP1 is installed. To disconnect JP1, simply remove the jumper cap of JP1 or put the jumper cap on either pin (single pin only) of JP1.

JP4	IRQ9
Installed	IRQ9 enabled
Open	IRQ9 disabled (default setting)

There are four additional jumpers, **JP2**, **JP5**, **JP6**, and **JP7** on your Display Card. All of these jumpers are reserved for engineering purposes and are pre-set from factory. Please do not change these jumpers before consulting with your supplier. JP2 is used for BIOS selection, as your display card comes with a 512K BIOS (two 256K BIOS). JP5 and JP6 are used for memory clock selection; and JP7 is used for pixel clock selection.

Enhanced Video Adapter

MegaEVA/32

User's Manual

Version 1.1
May 1st, 1993

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Introduction

Congratulations on the purchase of your Display Card. We would like to take a moment to familiarize you with some of your new card's special features.

1. **VGA Compatibility**

   Your Display Card is based on Tseng ET4000/W32 MegaVGA Chip which provides full VGA BIOS and Registers compatibility. The ET4000/W32 is fully compatible with millions of ET4000AX-based SVGA cards in VGA and extended modes.

2. **High Speed**

   Your Display Card is based on the Tseng ET4000/W32 chip which is the most powerful SVGA chip with built-in Local Bus interface, Windows acceleration capability, Multimedia Imaging Port and optional Hardware window (standard on May 1, 1993) support.

   If you have purchased the VESA Local Bus Display Card, your Display Card speed will no longer be limited by the slow 8/16-bit bus speed. Your Display Card bus speed will be greatly enhanced to nearly as fast as your computer CPU I/O speed.

3. **Extended Resolution and Colors**

   Your Display Card based on the Tseng ET4000/W32 chip supports extended resolution and colors conforming to generally accepted monitor frequency standards.

Resolution	Colors
640x480	Upto 16.7Million colors
800x600	Upto 65,536 colors
1024x768	Upto 256 colors
1280x1024	Upto 256 colors

4. **70Hz or 72Hz flicker-free display**

Your Display Card provides optional 70Hz and/or 72Hz vertical refresh rate for a flicker-free display upto 1024x768 resolution.

5. **Software Drivers for Extended Modes**

Your Display Card comes with the drivers for the following software.

Windows 3.1
AutoCAD Release 12, 11/386, 10/386
AutoShade 2 with RenderMan
3D Studio V1.x/2.x
Lotus 1-2-3 2.0-2.2
Symphony 2.0
GEM 2.2-3.1
Ventura 1.1-2.0
WordPerfect 5.0 and 5.1
WordStar Page Preview
VESA Super VGA BIOS Extension
8514/A AI

Due to the popularity of Tseng ET4000-family VGA chip, most leading software will be supported.

6. **Extended Text Display**

Your Display Card provides 132-column text for Lotus 1-2-3, Symphony, Word Perfect, etc. on VGA and variable-frequency monitors.

132-column text display is also widely used by popular emulator software to emulate terminals such as the DEC VT100 and the IBM 3278.

7. **Multiple Soft Fonts**

The Font Loader and Font Editor software utility let you design and use custom character fonts ideal for scientific and foreign language applications.

Installation

System Compatibility

Your Display Card that comes with ISA bus will operate in any IBM compatible PC, PC/XT, PC/AT, 80386- and 80486-based system.

Your Display Card that comes with VESA local bus will operate in any IBM compatible 80386 or 80486-based system supporting VESA local bus slot.

Note: IBM PC manufactured prior to April 1983 must have a new ROM module installed on the system board before you install your Display Card.

Installation Instructions

1. Power OFF the computer and related devices you may have attached to your computer and remove the computer cover.

2. Find an empty slot on you computer mainboard. Remove the screw which hold the chosen slot rear panel cover. Remove the cover and set the screw and cover aside.

3. Install your ISA bus Display Card firmly into any empty ISA bus slot or your VESA local bus Display Card firmly into a VESA local bus slot. Insert the screw that was removed and tighten firmly.

4. Carefully put back the computer cover and reconnect any previously removed cables.

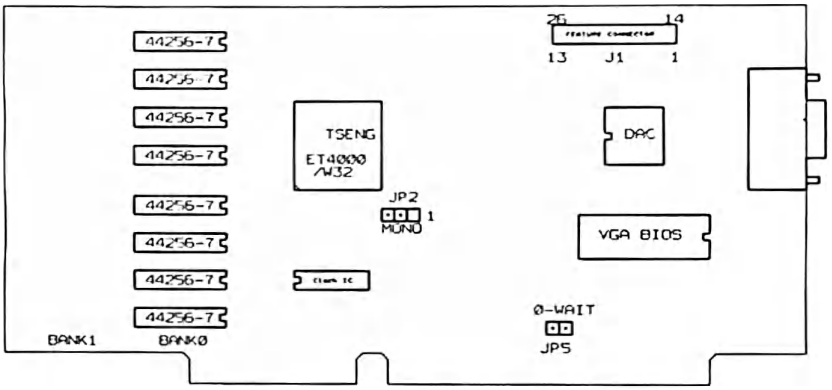
5. Your Display Card is now installed and ready to run.

Display Card Layout

Display Card with 16-bit ISA bus

Your Display Card with ISA Bus may come in one of the below layouts. Both layouts offer the same features.

1. **Layout A**



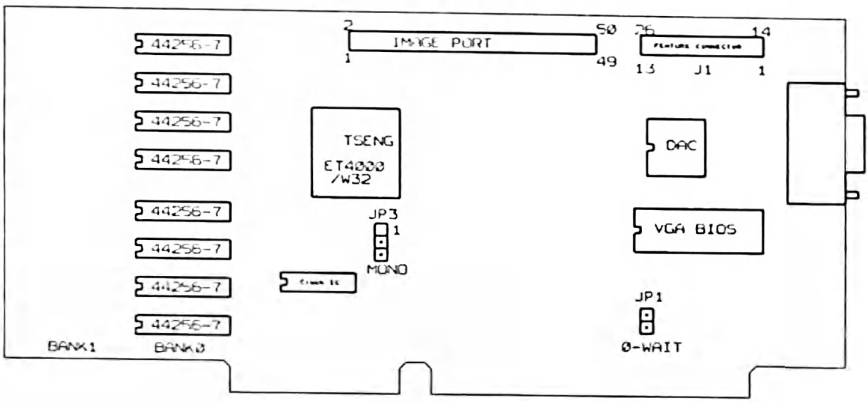
Jumper settings

JP5	0-Wait State
Install	0-Wait enabled (default setting)
Open	0-Wait disabled

JP5 is a 2-pin jumper to maximize the bus speed of your Display Card. Bus timings on different computer motherboards vary. JP5 should be disconnected if you find that your Display Card is not compatible with your PC motherboard when JP5 is installed. To disconnect JP5, simply remove the jumper cap of JP5 or put the jumper cap on either pin (single pin only) of JP5.

JP2	Memory decode
1&2	Monochrome card co-exist in the system
2&3	No monochrome card co-exist in the system (default setting)

2. Layout B



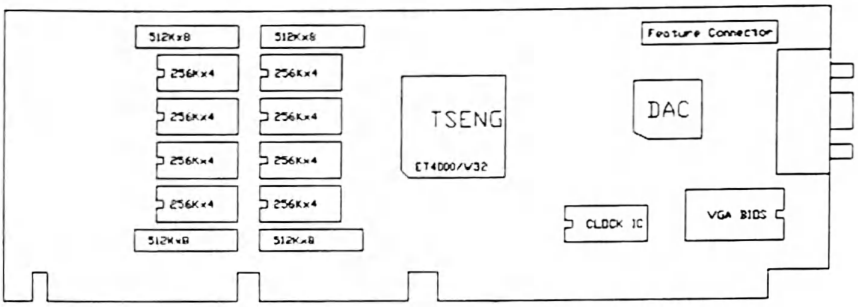
Jumper setting

JP1	0-Wait State
Install	0-Wait enabled (default setting)
Open	0-Wait disabled

JP1 is a 2-pin jumper to maximize the bus speed of your Display Card. Bus timings on different computer motherboards vary. JP1 should be disconnected if you find that your Display Card is not compatible with your PC motherboard when JP1 is installed. To disconnect JP1, simply remove the jumper cap of JP1 or put the jumper cap on either pin (single pin only) of JP1.

JP3	Memory decode
1&2	Monochrome card co-exist in the system
2&3	No monochrome card co-exist in the system (default setting)

Display Card with 32-bit VESA Local Bus



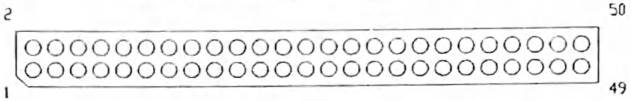
Connector Information

Your Display Card uses the same 15-pin (DB15) cable available from monitor manufacturers to interface with the IBM PS/2 computers. Using an incorrect cable may result in damage to the monitor and/or Display Card.

Direct Driver Video Display Connector (DB15-S)

J2	Signal Description	Pin
	Red	1
	Green	2
	Blue	3
Direct	Monitor ID bit 2	4
Drive	Ground	5
Video	Ground	6
Display	Ground	7
	Ground	8
	Not used	9
	Ground	10
	Monitor ID bit 0	11
	Monitor ID bit 1	12
	Horizontal Sync	13
	Vertical Sync	14
	Monitor ID bit 3	15

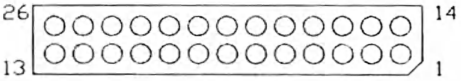
Image Port Pins Assignment



PIN #	Description
1	VCC
2	VCC
3	GND
4	GND
5	+12V
6	GND
7	IXCMD
8	GND
9	IXMSK
10	IXAEN
11	IDAT0
12	GND
13	IDAT1
14	IXFS
15	IDAT2
16	IXLS
17	IDAT3
18	GND
19	IDAT4
20	IXRDY
21	IDAT5
22	GND
23	IDAT6
24	IXOF
25	IDAT7

PIN #	Description
26	IXRW
27	DB0
28	GND
29	DB1
30	IXMAD
31	MEMW
32	GND
33	RESET
34	GND
35	DB2
36	DB3
37	DB4
38	DB5
39	DB6
40	DB7
41	DB8
42	DB9
43	DB10
44	DB11
45	DB12
46	DB13
47	DB14
48	DB15
49	GND
50	GND

Feature Connector Pins Assignment



PIN #	Description
1	P0
2	P1
3	P2
4	P3
5	P4
6	P5
7	P6
8	P7
9	PCLK
10	BLANK
11	HS
12	VS
13	GND

PIN #	Description
14	GND
15	GND
16	GND
17	EVID
18	ESYC
19	EDCK
20	NC
21	GND
22	GND
23	GND
24	GND
25	NC
26	NC

Software Utilities

The followings are the description of your Display Card's utility programs and other files which are included in your Utility & Driver disk.

FASTBIOS.SYS Speeds up video BIOS operations when used in 80286- and 80386-based systems. It must be installed as the FIRST device in the CONFIG.SYS file.

EANSI.SYS Replaces the ANSI.SYS device driver supplied on your DOS system disk. EANSI.SYS is compatible with the standard ANSI.SYS, and additionally supports the extended screen modes provided by your Display Card.

FONT.DOC Contains the latest information on the Font Editor and Font Loader, describing new fonts and features. Print this file and read it before using the font software.

FEDIT.COM The font editor, used to create new fonts and/or modify existing fonts. User's .FNT font files are also included on the diskette.

FLOAD.COM The font loader, used to load a selected font into video memory from disk.

TVDIAG.EXE Diagnostic program that tests the video modes of your Display Card and reports the configuration of the system. This test can also be used to check/align your display screen.

DMODE.EXE A menu-driven program which allows you to switch the Card's display modes and refresh rates.

README.DOC Contains additional information which was not available at the time this manual was printed.

The following pages contain detailed instructions on how to use these Utilities.

FASTBIOS.SYS Device Driver

The FASTBIOS.SYS device driver is used to transfer the contents of the video ROM BIOS to the PC system memory. This utility increase the video BIOS operation speed considerably when used in 80286- and 80386-based systems.

FASTBIOS.SYS is installed in the system CONFIG.SYS file as follow:

DEVICE=FASTBIOS.SYS

and must be the FIRST device driver in the CONFIG.SYS file. If this is not done, the following message may result upon loading:

> FASTBIOS NOT INSTALLED -- another (earlier installed) device driver has taken over the video interrupt; make sure the line DEVICE=FASTBIOS.SYS occurs first in your CONFIG.SYS file.

Should an attempt be made to install FASTBIOS.SYS in anything other than an 80286- or 80386-based system, the following message will result:

> FASTBIOS requires an 80286 or 80386 machine

When FASTBIOS.SYS is successfully installed the following message appears:

> FASTBIOS Installed

FASTBIOS.SYS, residing within CONFIG.SYS, can only be installed during system boot-up. Please remember to reboot your system after adding FASTBIOS to your CONFIG.SYS file, and ensure that the FASTBIOS.SYS file resides in the same directory as CONFIG.SYS.

Note: If your PC provides shadow RAM, please turn on the shadow RAM instead of using the FASTBIOS.SYS device driver. Shadow RAM provides the same high speed BIOS operation as FASTBIOS.SYS without consuming system memory.

EANSI.SYS Device Driver

EANSI.SYS is installed in the system CONFIG.SYS file with the following line:

DEVICE=EANSI.SYS

EANSI.SYS is compatible with the standard ANSI.SYS, and gives additional support for the extended screen modes provided by your Display Card. EANSI.SYS is a replacement for ANSI.SYS, and the two should not be used at the same time.

EANSI.SYS may be used to select the extended screen modes. This is accomplished by issuing an escape sequence with the "set mode" command, just as any standard mode would be selected with the normal ANSI.SYS. For example, screen mode 22 hex would be selected by sending the escape sequence:

(Esc)[=34h

to the screen. (Note that 34 is the decimal equivalent of 22 hexadecimal). To select other modes, simply replace 34 with the number of the mode you wish to select.

The available extended screen modes are as follows:

Mode	Columns	Rows
34 dec (22 hex)	132	44
35 dec (23 hex)	132	25
36 dec (24 hex)	132	28
42 dec (2A hex)	100	40
38 dec (26 hex)	80	60
2 dec (02 hex)	80	25

Font Loader and Font Editor

The Custom Font Loader and Font Editor let you instantly change the set of characters (character font) displayed on the screen. This is very useful for scientific and foreign language application, as well as for simply customizing the look of your screen.

Normally, fonts must be changed from within a program, but the Font Loader lets you change the displayed font with a single DOS command. You can load one of the several ready-made fonts provided on the Utility Diskette, or you can use the font editor to create or customize your own fonts.

The font software consists of:

FONT.DOC - the latest information about the font software, describing new fonts and features.

FEDIT.COM - the font editor, used to create new fonts and/or modify existing fonts. Start the Font Editor by typing the command "FEDIT" at the DOS prompt. Select the Help option in FEDIT's main menu for more information.

FLOAD.COM - the font loader, used to load a selected font from disk into video memory. Up to four fonts may be stored in video memory at once, with any one of the fonts selected for display.

Assorted fonts - fonts packaged on your Utility Diskette include the two standard fonts, a font designed for the APL language, and a thin, single-dot font. You may modify any of these fonts as you wish with the font editor. Files with the extension .FNT contain a font.

NOTE

Fonts may be loaded in text mode only. When a font is selected to be displayed, every character on the screen is immediately displayed in that new font.

TVDIAG Diagnostic Test Program

Included on the Utility Diskette is a test program called TVDIAG.EXE which can help you verify that your card and attached display monitor are working properly.

1. At the DOS prompt, type TVDIAG then press ENTER.

2. The test will start and it will prompt you with further instructions.

DMODE Utility for Display Mode Switching

Your Display Card is designed to provide compatibility with IBM's VGA, EGA CGA, and MDA standards provided that your monitor supports their frequencies.

DMODE.EXE is a utility program which is used for switching the display mode after the PC is turned-on. DMODE can be used to select various display standards (VGA, EGA, CGA), various display modes (132-column text, high resolution graphics, etc.), various refresh rates of a display mode (60Hz, 70Hz, 72Hz, etc.) and the type of monitor your Display Card supports.

DMODE is an easy-to-use, menu-driven program. By executing DMODE at DOS prompt, the following screen will appear.

Ver: 2.8w1	Display Mode Setup (DMODE)		03/10/93
--FEATURE--	-- OPTION ----------	--FEATURE--	-- OPTION ----------
Monitor 1	VGA	Gray Scale	OFF
Monitor 2	NONE	Memory Size	1M Bytes
Adapter	VGA	I/O Bus	16 Bits
Mode	03 Format : 80x25 16 Colors Text Mode		
Refresh Rate	[Fixed] 70Hz		
Operation :	Please press [◄] or [►] key to select Mode		
[▲▼ ◄►] : Select a FEATURE [SPACE] : Select next OPTION [ENTER] : Execute OPTION [Esc] : Activate OPTION and edit		[F1] : Video Information [F2] : VGA Mode Table [F3] : Advanced Features [F10] : To mode 3 or last mode	
(C) 1993 by TsengLabs Int'l for MegaEVA/32 cards.			

To use the program simply move the cursor to the required field, change the selection within the field by pressing the **spacebar**, and press **ENTER** key to activate the selections.

Easy to understand on-screen operating instructions are included and these will guide you through all the steps.

NOTE

The default mode of your Display Card is VGA. When, after selecting another mode, you wish to return to the default VGA mode, please run DMODE again and select the VGA mode. A "Soft-boot" of your PC (by pressing Ctrl-Alt-Del) does not change the mode of your Display Card.

DMODE commands

DMODE can also be used as a single command to select a display standard, a display mode or the refresh rate of a display mode, ect. without having to activate the DMODE menu. These DMODE commands are found to be very useful when added in the AUTOEXEC.BAT file to set default refresh rate of a display mode. For example, to set default refresh rate of 1024x768 to always be at 70Hz, please add **DMODE 38 70Hz** in the **AUTOEXEC.BAT**.

Following is a list of DMODE commands. If you cannot remember these commands please type DMODE COMMAND? for the listing.

DMODE {VGA/EGA/CGA/MDA}

Per IBM's VGA specification, your Display Card provides compatibility with EGA, CGA and MDA standards at BIOS-level. However, your Display Card also provides compatibility with the above standards at register-level through the DMODE command, e.g. **DMODE EGA**. Please note that your monitor must support the frequency of the display standard selected.

DMODE {mode number}

To activate a display mode. Upon execution of this command your entire screen will immediately be in the format of the selected mode number. For example upon executing **DMODE 38**, your screen will immediately turn into 1024x768, 256 colors display mode.

The mode numbers of your Display Card can be found on Section 5 of this manual or by typing DMODE MODE?

DMODE {mode number} {A}Hz

To set the default refresh rate (A) of a display mode. Where **A = 43.5, 56, 60, 70 or 72Hz**. This command will not immediately put the screen in the format of the selected mode number. For example when **DMODE 38 70Hz** is executed your Display Card will remember that whenever mode 38 is activated, it will always be displayed in 70Hz refresh rate.

The available refresh rates of the display modes can be found at the end of this section or by typing DMODE MODE?.

DMODE {16bit/8bit}

To select 16-bit or 8-bit bus operation for ISA bus Display Card. This command will not work on VESA Local Bus Display Card as it will always work in 32-bit bus operation.

DMODE {color/mono}

To select color or grayscale display.

DMODE MODE?

To display mode numbers table, their frequencies and refresh rates that are supported by your Display Card.

DMODE ?

To show your Display Card's default set-up information.

DMODE COMMAND?

To list these DMODE commands.

IMPORTANT

1. Please be sure that your monitor is capable of supporting the frequencies of a display mode selected.

2. DMODE will not allow you to select a display mode which is not supported by your Display Card.

3. **The software driver for a display mode is the same for different refresh rates.**

Selecting 70Hz or 72Hz flicker-free display

In addition to the standard 60Hz display, your Display Card provides 70Hz and 72Hz flicker-free display. You may select the 70Hz or 72Hz display via the DMODE menu or by using the **DMODE {mode number} {A}Hz** command as explained above.

The following is a list of available refresh rates of the display modes that your Display Card offers. Please make sure that your monitor is capable of supporting the frequencies required.

Resolution	Color	Horizontal Frequency	Vertical Frequency
640x480	16, 256, 32K, 64K, 16.7M	31.5KHz	60 Hz
640x480	16, 256, 32K, 64K	38 KHz	72 Hz
800x600	16, 256, 32K, 64K	35.5KHz	56 Hz
800x600	16, 256	38 KHz	60 Hz
800x600	16, 256	48 KHz	72 Hz
1024x768	16, 256	35.5KHz	43.5Hz *
1024x768	16, 256	48 KHz	60 Hz
1024x768	16, 256	56 KHz	70 Hz
1280x1024	16, 256	48 KHz	43.5Hz *

* = Interlaced display

Display Modes

Following are the details of the display modes that are supported by your Display Card.

Mode	Type	Colors/ Shades	Alpha Format	Buffer Start	Box Size	Max Pag.	Display Size	M-Clk (MHz)	HFreq (KHz)	VFreq (Hz)
0	A/N	16/256K	40x25	B8000	9x16	8	360x400	28.322	31.50	70.00
1	A/N	16/256K	40x25	B8000	9x16	8	360x400	28.322	31.50	70.00
2	A/N	16/256K	80x25	B8000	9x16	8	720x400	28.322	31.50	70.00
3	A/N	16/256K	80x25	B8000	9x16	8	720x400	28.322	31.50	70.00

Mode	Type	Colors/ Shades	Alpha Format	Buffer Start	Box Size	Max Pag.	Display Size	M-Clk (MHz)	HFreq (KHz)	VFreq (Hz)
4	APA	4/256K	40x25	B8000	8x8	1	320x200	25.175	31.50	70.00
5	APA	4/256K	40x25	B8000	8x8	1	320x200	25.175	31.50	70.00
6	APA	2/256K	80x25	B8000	8x8	1	640x200	25.175	31.50	70.00
7	A/N	mono	80x25	B0000	9x16	8	720x400	28.322	31.50	70.00
D	APA	16/256K	40x25	A0000	8x8	8	320x200	25.175	31.50	70.00
E	APA	16/256K	80x25	A0000	8x8	4	640x200	25.175	31.50	70.00
F	APA	mono	80x25	A0000	8x14	2	640x350	25.175	31.50	70.00
10	APA	16/256K	80x25	A0000	8x14	2	640x350	25.175	31.50	70.00
11*	APA	2/256K	80x30	A0000	8x16	1	640x480	25.175	31.50	60.00
11	APA	2/256K	80x30	A0000	8x16	1	640x480	32.500	38.50	72.00
12*	APA	16/256K	80x30	A0000	8x16	1	640x480	25.175	31.50	60.00
12	APA	16/256K	80x30	A0000	8x16	1	640x480	32.500	38.50	72.00
13	APA	256/256K	40x25	A0000	8x8	1	320x200	25.175	31.50	70.00
21	A/N	16/256K	132x60	B8000	8x8	2	1056x480	40.000	31.50	60.00
22	A/N	16/256K	132x44	B8000	8x9	2	1056x396	40.000	31.50	70.00
23	A/N	16/256K	132x25	B8000	8x16	4	1056x400	40.000	31.50	70.00
24	A/N	16/256K	132x28	B8000	8x14	4	1056x392	40.000	31.50	70.00
25*	APA	16/256K	80x60	A0000	8x8	1	640x480	25.175	31.50	60.00
25	APA	16/256K	80x60	A0000	8x8	1	640x480	32.500	38.50	72.00
26	A/N	16/256K	80x60	B8000	9x8	2	720x480	28.322	31.50	60.00
29*	APA	16/256K	100x37	A0000	8x16	1	800x600	36.000	35.50	56.00
29	APA	16/256K	100x37	A0000	8x16	1	800x600	40.000	38.00	60.00
29	APA	16/256K	100x37	A0000	8x16	1	800x600	50.350	48.20	72.00
2A*	A/N	16/256K	100x40	B8000	8x15	4	800x600	36.000	35.50	56.00
2A	A/N	16/256K	100x40	B8000	8x15	4	800x600	40.000	38.00	60.00
2A	A/N	16/256K	100x40	B8000	8x15	4	800x600	50.350	48.20	72.00
2D	APA	256/256K	80x25	A0000	8x14	1	640x350	25.175	31.50	70.00
2E*	APA	256/256K	80x30	A0000	8x16	1	640x480	25.175	31.50	60.00
2E	APA	256/256K	80x30	A0000	8x16	1	640x480	32.500	38.50	72.00
2F	APA	256/256K	80x25	A0000	8x16	1	640x400	25.175	31.50	70.00
30*	APA	256/256K	100x37	A0000	8x16	1	800x600	36.000	35.50	56.00
30	APA	256/256K	100x37	A0000	8x16	1	800x600	40.000	38.00	60.00
30	APA	256/256K	100x37	A0000	8x16	1	800x600	50.350	48.20	72.00
37*	APA	16/256K	128x48	A0000	8x16	1	1024x768	44.900	35.50	43.50
37	APA	16/256K	128x48	A0000	8x16	1	1024x768	65.000	48.20	60.00
37	APA	16/256K	128x48	A0000	8x16	1	1024x768	75.000	56.40	70.00
38*	APA	256/256K	128x48	A0000	8x16	1	1024x768	44.900	35.50	43.50
38	APA	256/256K	128x48	A0000	8x16	1	1024x768	65.000	48.20	60.00
38	APA	256/256K	128x48	A0000	8x16	1	1024x768	75.000	56.40	70.00
3D	APA	16/256K	160x64	A0000	8x16	1	1280x1024	80.000	48.20	43.50
3F	APA	256/256K	160x64	A0000	8x16	1	1280x1024	80.000	48.20	43.50

A/N = Alphanumeric modes (text)
APA = All Points Adressable modes (graphics)
* = Default mode

High Color and True Color Modes

Mode	Type	Colors/ Shades	Alpha Format	Buffer Start	Box Size	Max Pag.	Display Size	M-Clk (MHz)	HFreq (KHz)	VFreq (Hz)
2D	APA	32K/64K	80x25	A0000	8x14	1	640x350	50.350	31.50	70.00
2E	APA	32K/64K	80x30	A0000	8x16	1	640x480	50.350	31.50	60.00
2E	APA	32K/64K	80x30	A0000	8x16	1	640x480	65.000	38.50	72.00
2E	APA	16.7M	80x30	A0000	8x16	1	640x480	75.000	31.50	60.00
2F	APA	32K/64K	80x25	A0000	8x16	1	640x400	50.350	31.50	70.00
30	APA	32K/64K	100x37	A0000	8x16	1	800x600	72.000	35.50	56.00

A/N = Alphanumeric modes (text)
APA = All Points Adressable modes (graphics)
* = Default mode

Software Drivers

The drivers that support the extended colors and resolutions of your Display Card are included on your Driver disks. Following pages are instructions of how to use these drivers. Please follow these driver installation instructions carefully. As we are continuing to add more drivers for your Display Card, some of the drivers installation instructions may not be available at the time this manual is printed. Please read the README.DOC on the Driver disk(s) for the latest information on the available drivers or additional drivers, if any.

The drivers included on your Driver disk(s) are for the following software:

Windows 3.1
AutoCAD Release 12, 11/386, 10/386
AutoShade 2 with RenderMan
3D Studio V1.x/2.x
Lotus 1-2-3 2.0-2.2
Symphony 2.0
GEM 2.2-3.1
Ventura 1.1-2.0
WordPerfect 5.0 and 5.1
WordStar Page Preview
VESA Super VGA BIOS Extension
8514/A Emulation

Before installing these drivers, please make sure that the extended graphics mode you wish to use is supported by your Display Card and monitor. Choosing a higher resolution than your monitor is capable of displaying will give unsatisfactory results.

Drivers for Microsoft Windows 3.1

The drivers named "ET4-W32" in the Windows Setup use the ET4000/W32 accelerator features. The remaining drivers supplied are the same as used on Tseng ET4000 chip.

This driver disk is designed to allow you to select or change the video driver for Windows 3.1 using Windows Setup. Setup can be executed from within Windows, or from DOS.

Please note that these driver files are in compressed form. They will self-decompress by typing the filename itself. The drivers can only be accessed and executed by installing through Windows Setup. Simply copying the files into your \Windows\System subdirectory WILL NOT work and may corrupt your Windows Installation.

Installation

1. Having the drivers loaded on the hard disk will make it easier and faster to change resolutions in the future. Make a subdirectory to hold the driver files

   example: C:>MD\W32DRV

   and switch to that subdirectory (C:>CD\W32DRV)

2. Insert the driver disk into drive A: and type

   A:>W32WIN

   and the files will automatically decompress into your new subdirectory. For example C:\W32DRV>A:W32WIN.

3. From the Windows directory, type SETUP and select DISPLAY to change the video driver. Or, with Windows running, select Setup from the Program Manager Main group. Please refer to your Microsoft Windows User's Guide for assistance in running Setup from inside Windows.

4. Select "Other disk....." to direct the program to the subdirectory holding the new drivers. Please note that after the drivers are installed, you will not have to select "Other disk....." again should you decide to change resolutions.

   Look for the ET4000/W32- or ET4000-based drivers in the Display selection menu to select the display resolution you want.

5. When asked where the drivers will be found, state the following (deleting what the program has displayed in the input windows):

   [drive:]\[directory]

   example C:>\W32DRV

6. A standard Windows selection menu will appear with additional video drivers from which to select.

7. Proceed normally through the remainder of the process.

Note: Also included are Tseng drivers for 32K, 64K and 16.7M simultaneous colors. If you attempt to run Windows with a driver for which your display card cannot support, a brief message will appear in the upper left of your screen "video driver unable to set desired mode" before returning you back to the DOS prompt. If this occurs, simply run the Setup program again and choose a supported mode.

Drivers for Ventura Publisher Versions 1.1-2.0

The enclosed Ventura 800x600 and 1024x768 driver files must be installed **AFTER** Ventura Publisher has been installed on your system.

Installation

1. Follow the Ventura installation instructions. When you are asked to select a video adapter, choose

   IBM Personal System/2 (640x480) two colors (Version 1.1) or
   IBM VGA or Compatible (640x480) 2 colors (Version 2.0)

2. Complete the Ventura Publisher installation and check that it is working properly using the installed IBM driver.

3. Exit Ventura Publisher and insert the Driver Disk in your A: drive.

   Log on to your A: drive, and type

   A:>VPDRV2 _0 [ENTER]

4. The program will ask you some questions about your Ventura configuration. Answer them appropriately.

5. When the program asks you what display device and resolution you want to install for, make a selection from:

   VGA Adapter (800x600) 16 colors or greys or
   VGA Adapter (1024x768) 16 colors or greys

   depending on whichever is appropriate or desirable for your hardware configuration.

   The driver will now be installed and you can log back on to the hard disk drive and begin using Ventura.

Drivers for GEM 2.2-3.1

The drivers whose file extensions end in .VGA are for GEM Versions 3.0-3.1, while those ending in .SYS are for GEM Version 2.2. This is transparent to the individual GEM programs as they will seek out the appropriate driver files during loading.

Please also note that the Driver Disk supplied to you is created specifically for the drivers contained therein. The original has a volume label called **GEM DRIVRPK** that GEM must see in order to load the drivers. If you need an additional back-up copy of the driver disk, it must be copied using the DOS DISKCOPY command in order to get an identical copy of the original.

Installation for GEM 2.2

The enclosed GEM driver files require a new **GEMSETUP.TXT** file to be installed in place of that which is on **GEM Device Driver Disk #1**.

1. Make a DISKCOPY of the **GEM Device Driver Disk #1**. This copy will be used instead of the original during installation.

2. Copy **GEMSETUP.V22** from your Driver Disk to the newly-created copy of the GEM Device Driver Disk #1, as **GEMSETUP.TXT**.

   Example: **C:>COPY A:GEMSETUP.V22 B:GEMSETUP.TXT**

   After the GEM Device Driver Disk #1 is copied with the new GEMSETUP.TXT file, you can proceed with the installation.

3. Install GEM as per instructions. When the program asks, "Which graphics card and display do you have?", respond with choice:

   VGA Adapter (800 x 600) 16-color Mode;VGA 800 or
   VGA Adapter (1024 x 768) 16-color Mode;VGA 1024

   The GEM installation program will ask you to insert the Driver Disk into drive A: and the installation will continue. Complete the GEM installation as instructed.

Installation for GEM 3.0-3.1

The enclosed GEM driver files require a new **GEMSETUP.TXT** file to be installed in place of that which is on **GEM System Master Disk**. The drivers make full use of the extended graphics modes of the Display Card.

1. Make a DISKCOPY of the **GEM System Master Disk**. This copy will be used instead of the original during installation.

2. Copy the appropriate Setup file, GEMSETUP.V31 for Version 3.1 or GEMSETUP.V30 for Version 3.0, from your Driver Disk to the newly-created copy of the GEM System Master Disk, as GEMSETUP.TXT.

   For Version 3.0, **C:>COPY A:GEMSETUP.V30 B:GEMSETUP.TXT**
   For Version 3.1, **C:>COPY A:GEMSETUP.V31 B:GEMSETUP.TXT**

3. After the GEM System Master Disk is copied and prepared with the new GEMSETUP.TXT file, you can proceed with the installation.

4. The installation of VGA extended mode drivers is a 2-step process.

   a. Install GEM as per instructions, selecting

      IBM 16-Color VGA for PS/2 (640x480) or Compatible

      as your video driver. Complete the GEM installation instructions normally. After completing installation, it is a good idea to start GEM to ensure that it operates properly before doing the next step.

   b. Assuming that GEM worked properly with the IBM VGA driver loaded, reinsert your **System Master Disk** and run GEMPREP again. This time, choose to change your configuration. Select from the followings:

      VGA Adapter (800x600) 16-Color Mode or
      VGA Adapter (1024x768) 16-Color Mode

      The program will ask you to insert the GEM DRIVER PACK diskette. This is your Display Card's Driver Disk. The driver will load and the program will conclude.

Drivers for WordPerfect 5.0-5.1

The enclosed drivers, **WP800.WPD**, **WP1024.WPD** are for WordPerfect 5.0 and **WP51ET4.VRS** is for WordPerfect 5.1. The drivers need to be copied to the directory where WordPerfect resides. Upon loading the program the following steps should be taken to choose the desired resolution:

1. From the document screen displayed after entering WordPerfect, press **SHIFT/F1** to get to the Setup menu.

2. From Setup, choose Display option. This brings the Setup: Display menu.

3. From the Setup: Display menu, choose "Graphics Screen Type".

4. From the Setup: Graphics Screen Type menu, choose either;
   VGA Adapter 800x600 16 color or
   VGA Adapter 1024x768 16 color (V 5.0)

   or the "Tseng ET4000 Based SVGA" option **(V 5.1)** and select from
   VGA 1024x768 16 color
   VGA 1024x768 256 color
   VGA 800x600 16 color
   VGA 800x600 256 color
   VGA 640x480 16 color
   VGA 640x480 256 color

5. To change the Text Screen Driver (V 5.1), choose the "Tseng ET4000 Based SVGA" option from the Setup: Text Screen Driver menu, and select:
   100x40 16 Color
   132x25 16 Color
   132x28 16 Color
   132x44 16 Color
   80x25 16 Color
   80x28 16 Color
   80x43 16 Color
   80x50 16 Color
   80x60 16 Color

6. Exit from the menus and begin using WordPerfect.

Drivers for Lotus 1-2-3 and Symphony

The extended text drivers in your \LOTUS subdirectory supports Lotus 1-2-3 Release 2, 2.01, 2.2 and Symphony Release 2.0 in 80x25, 132x25, 132x28, 132x44 and 80x60 modes. There is also the **'All Color text Modes'** driver which supports all above five text display modes of the Display Card. When this driver is selected, each time you enter an individual Lotus program or utility, you are offered the choice of any of the five display modes. This allows you to switch between 80-column and 132-column displays without exiting to DOS.

We have provided six drivers to give you complete flexibility in configuring Lotus products to meet your needs. If you always want a 132x28 display, install the 132x28 driver and you will automatically get that display every time you start a program from the Lotus or Access menu. If you want the 80x25 display most of the time for speed and ease of reading, but want to be able to switch to the 132x44 display quickly to get an overall view of your spreadsheets, install the 'All Modes' driver and select the desired display each time you start 1-2-3 or Symphony. We've left you the freedom to pick the drivers that are right for you.

ONE NOTE: when you are using the **'All Color Text Modes'** driver, whenever you enter the Translate utility from the Lotus or Access menu, you should have 80x25 mode selected. The Translate utility operates differently from the other programs and utilities, and often does not show 132-column displays properly from the 'All Modes' driver. Also, the Install utility always comes up in 80-column mode, no matter what driver is used.

Installation

Please note that the following instruction assumes that you have a Hard Disk system.

1. Text drivers are on the Driver Disk in the LOTUS subdirectory. Copy all text drivers from the Driver Disk into the directory that has the Lotus program files.

   COPY A:\LOTUS*.DRV

2. Run the Lotus Install program and select **Advanced Options** from the main menu. Select **Add New Drivers to Library.** Please note that this step only needs to be performed once.

3. The Advanced Options Menu will appear on your screen. Select **Modify Current Driver Set** and press RETURN. The currently selected drivers will appear on your screen. **Select Text Display** and press RETURN.

4. The text display drivers will appear on your screen. Select the driver you want to use and press RETURN.

   VGA Adapter (All Color Text Modes)
   VGA Adapter (80x25 Color Text Only)
   VGA Adapter (132x25 Color Text Only)
   VGA Adapter (132x28 Color Text Only)
   VGA Adapter (132x44 Color Text Only)
   VGA Adapter (80x60 Color Text Only)

5. After you have made the selection, please select **Return to Menu** and **Save Changes**.

6. The Install program will prompt you for the name of your driver set. Lotus 1-2-3 and Lotus Symphony permit selection of the driver set to use when you start the program. If you want to name the driver set, type the name and then press RETURN. For example, if you selected the VGA Display (132x28) driver you may wish to name it VGA28. To save the current driver set using the default name of 123 for Lotus 1-2-3 or LOTUS for Lotus Symphony simply press RETURN. These default driver sets will be used automatically if you don't explicitly select another driver set when you run Lotus or Access.

7. The Install program will inform you that the driver set has been saved. Press RETURN. The Exit Menu will appear on your screen. You can create additional driver sets at any time by selecting the **Advanced Options Menu**, **Modify Current Driver Set**, and **Save Changes** procedures of the Install program.

If you are starting Lotus 1-2-3:

Type **LOTUS** and press RETURN to use the default driver set named **123**.

Type **LOTUS VGA28** and press RETURN, where **VGA28** is the name of the driver set you created using 132 column by 28 row text driver.

If you are starting Lotus Symphony:

Type **ACCESS** and press RETURN to use the default driver set named **LOTUS.**

Type **ACCESS VGA28** and press RETURN, where **VGA28** is the name of the driver set you created using for 132 column by 28 row text driver.

Using 'All Color Text Modes' text display for Lotus 1-2-3 and Symphony

If you select the '**All Color Text Modes**' text driver, after entering 1-2-3, a pop-up menu is activated by issuing a **Ctrl-A** key input sequence, at which time the text display mode selection menu appears. After selecting the desired mode, the RETURN or ENTER key is pressed causing the system to beep. This indicates that the desired mode has been set. You must then EXIT to the Lotus Access menu if the program was entered through the LOTUS command, or back to DOS if the program was entered with the 1-2-3 command, in order to invoke the desired mode selection.

Drivers for WordStar Page Preview

WordStar's Advanced Page Preview requires an external driver to realize graphic displays in resolutions of 800x600 and/or 1024x768. The WordStar files PREVIEW.OVR and PREVIEW.MSG, as well as **TLIVGA6.WGD** and **TLIVGA7.WGD** need to be copied to the WordStar directory from your Driver Disk.

The following versions of WordStar are compatible with the Advanced Page Preview:

WordStar 5.5
WordStar 6.0a - 6.0d
WordStar 2000

Users of WordStar 5.5 through 6.0c, and WordStar 2000 3.5a - 3.5c should replace the PREVIEW files with those provided on the driver diskette. The revision number can be determined by looking at the first line of the flash screen.

Invoking the High-resolution Driver

You must specify the driver name within the **FONTID.CTL** file so that it can be found by the program. Edit the FONTID.CTL (a non-document ASCII file) and change the CRT_TYPE line to read:

CRT_TYPE=TLIVGAx.WGD

where **x** is either 6 or 7 for 800x600 or 1024x768 resolution, respectively.

You can begin using your version of WordStar with the hi-res Advanced Page Preview.

Drivers for VESA Super VGA BIOS Extension

TLIVESA.COM is the VESA Super VGA BIOS Extension driver for your Display Card based on Tseng Labs ET4000 and ET4000/W32 chip. The driver implements Version 1.1 of the VESA specification and is a terminate-and-stay-resident (TSR) program which intercepts the video BIOS interrupt vector to provide additional BIOS commands supporting super-VGA modes. The driver is located on your Driver Disk under the VESA subdirectory.

To load, type the command:

TLIVESA [ENTER]

at the DOS prompt. TLIVESA may be loaded through a batch file for convenience.

After loading the driver, any VESA application can be run.

The program can also be unloaded, freeing up memory, provided no other resident program which intercepts the video BIOS interrupt vector is loaded afterward. (Actually, no resident program at all should be loaded afterward in order to really free the memory.)

To unload, type the command:

TLIVESA U [ENTER]

Unloading TLIVESA may also be performed through a batch file.

8514/A Emulation Driver

The instructions that follow explain how to install the appropriate 8514/A emulation drivers for your needs. On the Driver Disk under 8514AI subdirectory are the driver files.

Two emulators are provided. Choose either emulator depending on your video memory configuration and number of colors desired. The following table illustrates the resolutions available by driver name according to the video memory configuration on your Display Card.

Resolution	Color	Mode (hex)	Memory required	Driver
640x480	16	12	512KB	RIXAI4
1024x768	16	37	512KB	RIXAI4
640x480	256	2E	512KB	RIXAI8
1024x768	256	38	1MB	RIXAI8

Installation

1. Copy the drivers from the 8514AI subdirectory of the Driver Disk to a newly created subdirectory on the hard disk called RIXAI or another name of your choosing.

2. Type **RIXAIx** at the DOS prompt, where **x** is either **4** or **8**.

3. You can now run your application software under 8514/A emulation.

Please remember to load the appropriate emulation driver before running application software that requires 8514/A. You might want to create a simple batch file that loads the emulation driver and your software automatically to simplify the process.

You may need to reconfigure some software to run under an 8514/A driver. Please check the user manuals of your applications to determine if such a driver is supported.

To unload the driver, simply type **RIXAIx /U**.

Technical Information

Using the Extended Text Modes

The following describes how to select the Display Card's 132-column text modes from application programs and how the 132-column text modes memory map is organized. Your Display Card BIOS supports the following 132- and 80-column text modes. These modes are not used by IBM VGA. The numbers are in decimal except as noted.

Mode	Column	Row	Length of Memory Map
22 hex	132	44	132x44x2 = 11616 = 2D60 hex
23 hex	132	25	132x25x2 = 6600 = 19C8 hex
24 hex	132	28	132x28x2 = 7392 = 1CEO hex
2A hex	100	40	100x40x2 = 8000 =1F40 hex
26 hex	80	60	80x60x2 = 9600 = 2580 hex

The 132-column modes are selected just like as the standard modes 0-7 and D-13 are selected:

- Place a 0 in register AH to indicate "select mode" function.
- Place the mode number in register AL.
- Execute an INT 10H instruction, generating software interrupt 10 hex, which invokes the Display Card BIOS to set the mode.

Extended Text Mode memory Map

The 132-, 100-, and 80-column color text memory map begins at B800:0000 (monochrome at B000:0000), just like other text modes. Memory is organized with even bytes as character codes and odd bytes as attributes, again just like normal text. The row offset register (CRTC register 13 hex) is normally set to 66 (42 hex) to compensate for the greater width of the screen, and so the start of each row is 264 bytes after the start of the row above it, as opposed to the 80-column row offset register of 40 (28 hex) and 160 bytes from the start of one row to the start of the next.

As indicated in the table above, the lengths of the 132-, 100-, and 80-column memory maps are longer than the normal 80x25 length of 4000 bytes.

Programming Interface

The functions that are supported as program calls to the Display Card are listed in this section. These calls are made through software interrupt 10H (INT 10H).

Functions are identified by the content of the AH register at the time of the call; in some cases, the AH register identifies a group of similar functions and the AL register identifies the specific function. The primary functions are:

Interrupt 10 Functions

(AH)	Function
00H	Mode Set
01H	Set Cursor Type
02H	Set Cursor Position
03H	Read Cursor Position
04H	Read Light Pen Position (not supported)
05H	Select Active Display Page
06H	Scroll Active Page Up
07H	Scroll Active Page Down
08H	Read Character at Current Cursor Position
09H	Write Character(s) at Current Cursor Position
0AH	Write Character(s) Only at Current Cursor Position
0BH	Set Color Palette
0CH	Write Dot
0DH	Read Dot
0EH	Write Teletypewriter to Active Page
0FH	Return Current Video State
10H	Set Palette Registers
11H	Character Generator Routine
12H	Alternate Select
13H	Write String
1AH	Display Combination Code
1BH	Return Functionality/State Information
1CH	Save/Restore
14H	Reserved
15H	Reserved
16H	Reserved
17H	Reserved
18H	Reserved
19H	Reserved

Additional Interface specification for INT 10

AX = 10F0h set_hicolor_mode

1. Set 16 bpp mode

   Input:
   BL=a 256-color mode (see table below)
   Output:
   AL=010h, AH=0 if successful

   Note: if bit 7 of BL is 1, then the regen buffer is not clear.

Mode	Display Size	Memory Required
2Dh	640x350	512K bytes
2Eh	640x480	1024K bytes
2Fh	640x400	512K bytes
30h	800x600	1024K bytes

2. Set 24 bpp mode

   Input:
   BL=0FFh
   BH=a 256-color mode (see table below)
   Output:
   AL=010h, AH=0 if successful

   Note: if bit 7 of BH is 1, then the regen buffer is not clear.

Mode	Display Size	Memory Required
2Dh	640x350	1024K bytes
2Eh	640x480	1024K bytes
2Fh	640x400	1024K bytes

AX = 10F1h get_ramdac_type

Input:
none
Output:
AL=010h, AH=0 if successful
BL=DAC type (see table below)

DAC type	Description
0	normal DAC
1	Sierra HiColor DAC (type 1: 5r-5g-5b format)
2	Sierra HiColor DAC (type 2: 5r-6g-5b format)
3	AT&T True Color DAC (8r-8g-8b format)
4	Cirrus Logic True Color DAC (8r-8g-8b format)
5	Sierra True Color DAC (8r-8g-8b and 8b-8g-8r format)
6	Inmos True Color DAC (8r-8g-8b)
7	Music True Color DAC (8b-8g-8r)

AX = 10F2h Get/Set Hicolor Format

1. Get Hicolor format
   Input:
   BL=0
   Output:
   AL=010h, AH=0 if successful
   BL=code for current (resulting) hicolor format (see table below)

2. Set Hicolor format
   Input:
   BL=code for hicolor to set (see table below)
   Output:
   AL=010h, AH=0 if successful
   BL=code for current (resulting) hicolor format (see table below)

Code	Hicolor format, with definition of pixel bit fields
0	not hicolor format
1	15bpp 5r-5g-5b format <15>=resvd, <14:10>=red, <9:5>=green, <4:0>=blue)
2	16bpp 5r-6g-5b format (<15:11>=red, <10:5>=green, <4:0>=blue)
3	24bpp 8r-8g-8b (<23:16>=red, <15:8>=green, <7:0>=blue)
4	24bpp 8b-8g-8r (<23:16>=blue, <15:8>=green, <7:0>=red)

Examples:

```
/*=====================================*
*       Function:  Get DAC type       *
*-------------------------------------*
*       Retrun: -1 == BIOS cannot support hicolor function *
*                0 == normal DAC      *
*                1 == Sierra hicolor DAC (type 1)  *
*                2 == Sierra hicolor DAC (type 2)  *
*                3 == AT&T true color DAC          *
*                4 == Cirrus Logic true color DAC  *
*                5 == Sierra true color DAC        *
*                6 == Inmos true color DAC         *
*                7 == Music true color DAC         *
*=====================================*/
get_dac_type ()
        {
        union   REGS    r;
        r.x.ax=0x10F1;
        int86 (0x10,&r,&r);
        if (r.x.ax!=0x0010)   return(-1);
        else                  return(r.h.bl);
        }
/*=====================================*
*       Function :  Set 32K Color Mode (5r-5g-5b format)  *
*-------------------------------------*
*       Input:    256 colors mode     *
*       Return:   0 == Error          *
*                 1 == OK             *
*=====================================*/
set_32k_mode (int mode)
        {
        union    REGS    r;
        r.x.ax=0x10F0;
        r.h.bl=mode;
        int86 (0x10,&r,&r);
        if (r.x.ax!=0x0010)    return(0);
        r.x.ax=0x10F2;
        r.h.bl=1;
        int86 (0x10,&r,&r);
        if (r.x.ax!=0x0010)   return(0);
        else                  return(1);
        }
```

```
/*=====================================*
*       Function : Set 64K Color Mode (5r-6g-5b format)  *
*-------------------------------------------------------*
*       Input:    256 colors mode                       *
*       Return:   0 == Error                            *
*                 1 == OK                               *
*=====================================*/
set_64k_mode (int mode)
        {
        union    REGS     r;
        r.x.ax=0x10F0;
        r.h.bl=mode;
        int86 (0x10,&r,&r);
        if (r.x.axl=0x0010)    return(0);
        r.x.ax=0x10F2;
        r.h.bl=2;
        int86 (0x10,&r,&r);
        if (r.x.axl=0x0010)   return(0);
        else                  return(1);
        }

/*=====================================*
*       Function : Set 16M Color Mode                   *
*-------------------------------------------------------*
*       Input:    256 colors mode                       *
*       Return:   0 == Error                            *
*                 1 == OK                               *
*=====================================*/
set_16m_mode (int mode)
        {
        union    REGS     r;
        r.x.ax=0x10F0;
        r.h.bh=mode;
        r.h.bl=0xff;
        int86 (0x10,&r,&r);
        if (r.x.axl=0x0010)   return(0);
        else                  return(1);
        }
```

VESA Super VGA BIOS Programming

VESA Mode Supported:

Mode No.	Description
0100h	640x400x256
0101h	640x480x256
0102h	800x600x16
0103h	800x600x256
0104h	1024x768x16
0105h	1024x768x256
0106h	1280x1024x16
0108h	80x60 text
0109h	132x25 text
010Ch	132x60 text
0022h*	132x44 text
0024h*	132x28 text
002Ah*	100x40 text
002Dh*	640x350x256
010Dh	320x200x32768
005Dh*	640x350x32768
005Fh*	640x400x32768
0110h	640x480x32768
0113h	800x600x32768
010Eh	320x200x65536
006Dh*	640x350x65536
006Fh*	640x400x65536
0111h	640x480x65536
0114h	800x600x65536
0112h	640x480x16777216

* These modes are not standard VESA modes but are supported by Tseng Labs VESA BIOS extension Driver for ET4000/W32 chip.

VESA Driver Function Call:

AH = 04Fh Super VGA extended BIOS function
Note: all functions return status in AX = 04Fh if success
= 14Fh if fail

AL = 0 SuperVGA Information

Copy vga_info_block into buffer
input:
ES:DI = ptr to buffer
return:
AX = status
vga_info_block:

vesa_sig	db	'VESA'
vesa_vers	dw	0101h
tli_string_off	dw	offset ptr to tli_string
tli_string_seg	dw	segment of tli_string
capabilities	db	4 dup (0)
video_modes_off	dw	offset ptr to video_modes_3/4
video_modes_seg	dw	segment of video_modes_3/4
total_mem	dw	no. of 64k blocks of video mem have

AL = 1 supervga_mode_info

copy mode info into buffer & clear rest of buffer to 256 bytes
input:
CX = supervga mode
ES:DI = ptr to 256 bytes buffer
return:
AX = status
mode info:

dw	mode attributes
db	win A attributes (writable)
db	win B attributes (readable)
dw	window granularity
dw	window size
dw	win A cpu segment
dw	win B cpu segment
dw	ptr to window func
dw	segment of window func
dw	bytes per scanline
dw	x resolution

```
        dw      y resolution
        db      char width
        db      char height
        db      no. of planes
        db      bits per pixel
        db      no. of banks
        db      memory model
        db      bank size
        db      no. of image pages
        db      reserved
        db      memsize required (units of 64k)
```

AL = 2 set_supervga_mode

set video mode
input:
BX = mode no. to be set (if bit 15=1, don't clear video mem)
return:
AX = status

AL = 3 get_video_mode

get video mode no.
input:
none
return:
AX = status
BX = video mode (VESA mode if is one, else normal mode no.)

AL = 4 save_res_supervga_state

save or restore video state
input:
CX = flag with bits=1 saying what to save/restore:
bit 0: hardware state
bit 1: bios data state
bit 2: DAC state
bit 3: supervga state
DL = 0 return BX=no. of 64 byte blocks needed for state buffer
= 1 save state
= 2 restore state
ES:BX = ptr to buffer (while DL=1, 2)
return:
AX = status

AL = 5 window_control
set/get GDC segment select register to DX
input:
BH = 0 set window BL to DX
= 1 return DX=value of window BL
BL = 0 window A (write)
= 1 window B (read)
return:
AX = status

AL = 6 set_get_log_scan_length
set or get the length of a scanline
input:
BL = 0 set width of a scanline
CX= pixels of a scanline to be set (round up if necessary)
BL = 1 get width of a scanline, etc.
return: (for both BL= 0 or 1)
AX = status
BX = length in bytes
CX = actual no. of pixels
DX = max no. of scanlines possible with this length

AL = 7 set_get_display_start
set or get display start position
input:
BH = 0
BL = 0 set display start to x=CX, y=DX (x, y in pixels)
= 1 return current display start: CX=x, DX=y, also return BH=0
return:
AX = status

Additional BIOS Function Calls and Programming Interface

The Tseng ET4000/W32 Data Book which contains chip Registers information and BIOS Function Calls for serious programming is available at a small cost. Please contact your Dealer if you would like to obtain a copy.

Display Mode Table

Mode	Type	Color/ Shade	Alpha Format	Buffer Start	Box Size	Max Pag.	Display Size	M-Clk (MHz)	HFrq (KHz)	VFrq (Hz)	Mem. Req'd
0	A/N	16/256K	40x25	B8000	9x16	8	360x400	28.322	31.50	70.0	256K
1	A/N	16/256K	40x25	B8000	9x16	8	360x400	28.322	31.50	70.0	256K
2	A/N	16/256K	80x25	B8000	9x16	8	720x400	28.322	31.50	70.0	256K
3	A/N	16/256K	80x25	B8000	9x16	8	720x400	28.322	31.50	70.0	256K
4	APA	4/256K	40x25	B8000	8x8	1	320x200	25.175	31.50	70.0	256K
5	APA	4/256K	40x25	B8000	8x8	1	320x200	25.175	31.50	70.0	256K
6	APA	2/256K	80x25	B8000	8x8	1	640x200	25.175	31.50	70.0	256K
7	A/N	mono	80x25	B0000	9x16	8	720x400	28.322	31.50	70.0	256K
D	APA	16/256K	40x25	A0000	8x8	8	320x200	25.175	31.50	70.0	256K
E	APA	16/256K	80x25	A0000	8x8	4	640x200	25.175	31.50	70.0	256K
F	APA	mono	80x25	A0000	8x14	2	640x350	25.175	31.50	70.0	256K
10	APA	16/256K	80x25	A0000	8x14	2	640x350	25.175	31.50	70.0	256K
11*	APA	2/256K	80x30	A0000	8x16	1	640x480	25.175	31.50	60.0	256K
11	APA	2/256K	80x30	A0000	8x16	1	640x480	32.500	38.50	72.0	256K
12*	APA	16/256K	80x30	A0000	8x16	1	640x480	25.175	31.50	60.0	256K
12	APA	16/256K	80x30	A0000	8x16	1	640x480	32.500	38.50	72.0	256K
13	APA	256/256K	40x25	A0000	8x8	1	320x200	25.175	31.50	70.0	256K
21	A/N	16/256K	132x60	B8000	8x8	2	1056x480	40.000	31.50	60.0	256K
22	A/N	16/256K	132x44	B8000	8x9	2	1056x396	40.000	31.50	70.0	256K
23	A/N	16/256K	132x25	B8000	8x16	4	1056x400	40.000	31.50	70.0	256K
24	A/N	16/256K	132x28	B8000	8x14	4	1056x392	40.000	31.50	70.0	256K
25*	APA	16/256K	80x60	A0000	8x8	1	640x480	25.175	31.50	60.0	256K
25	APA	16/256K	80x60	A0000	8x8	1	640x480	32.500	38.50	72.0	256K
26	A/N	16/256K	80x60	B8000	9x8	2	720x480	28.322	31.50	60.0	256K
29*	APA	16/256K	100x37	A0000	8x16	1	800x600	36.000	35.50	56.0	256K
29	APA	16/256K	100x37	A0000	8x16	1	800x600	40.000	38.00	60.0	256K
29	APA	16/256K	100x37	A0000	8x16	1	800x600	50.350	48.20	72.0	512K
2A*	A/N	16/256K	100x40	B8000	8x15	4	800x600	36.000	35.50	56.0	256K
2A	A/N	16/256K	100x40	B8000	8x15	4	800x600	40.000	38.00	60.0	256K
2A	A/N	16/256K	100x40	B8000	8x15	4	800x600	50.350	48.20	72.0	512K
2D	APA	256/256K	80x25	A0000	8x14	1	640x350	25.175	31.50	70.0	512K
2E*	APA	256/256K	80x30	A0000	8x16	1	640x480	25.175	31.50	60.0	512K
2E	APA	256/256K	80x30	A0000	8x16	1	640x480	32.500	38.50	72.0	512K
2F	APA	256/256K	80x25	A0000	8x16	1	640x400	25.175	31.50	70.0	512K
30*	APA	256/256K	100x37	A0000	8x16	1	800x600	36.000	35.50	56.0	512K
30	APA	256/256K	100x37	A0000	8x16	1	800x600	40.000	38.00	60.0	512K
30	APA	256/256K	100x37	A0000	8x16	1	800x600	50.350	48.20	72.0	1024K
37*	APA	16/256K	128x48	A0000	8x16	1	1024x768	44.900	35.50	43.5	512K
37	APA	16/256K	128x48	A0000	8x16	1	1024x768	65.000	48.20	60.0	512K
37	APA	16/256K	128x48	A0000	8x16	1	1024x768	75.000	56.40	70.0	512K

Mode	Type	Color/ Shade	Alpha Format	Buffer Start	Box Size	Max Pag.	Display Size	M-Clk (MHz)	HFrq (KHz)	VFrq (Hz)	Mem. Req'd
38*	APA	256/256K	128x48	A0000	8x16	1	1024x768	44.900	35.50	43.5	1024K
38	APA	256/256K	128x48	A0000	8x16	1	1024x768	65.000	48.20	60.0	1024K
38	APA	256/256K	128x48	A0000	8x16	1	1024x768	75.000	56.40	70.0	1024K
3D	APA	16/256K	160x64	A0000	8x16	1	1280x1024	80.000	48.20	43.5	1024K
3F	APA	256/256K	160x64	A0000	8x16	1	1280x1024	80.000	48.20	43.5	2048K

High Color and True Color Modes

2D	APA	32K/64K	80x25	A0000	8x14	1	640x350	50.350	31.50	70.0	1024K
2E	APA	32K/64K	80x30	A0000	8x16	1	640x480	50.350	31.50	60.0	1024K
2E	APA	32K/64K	80x30	A0000	8x16	1	640x480	65.000	38.50	72.0	1024K
2E	APA	16.7M	80x30	A0000	8x16	1	640x480	75.000	31.50	60.0	1024K
2F	APA	32K/64K	80x25	A0000	8x16	1	640x400	50.350	31.50	70.0	1024K
30	APA	32K/64K	100x37	A0000	8x16	1	800x600	72.000	35.50	56.0	1024K

A/N = Alphanumeric modes (text)
APA = All Points Adressable modes (graphics)
* = Default mode

Service

In case of Difficulty

If you have problems after installation, one of the following is likely to be the cause.

a. Ensure that all cables are properly connected, and that all plugs are firmly seated in their sockets.

b. Ensure that the display monitor is properly connected and that its power is turned on.

Turn the power to the computer system OFF and all other connected devices before checking the following:

c. Ensure that the switches on your Display Card (if any) are set properly and that the board is fully seated in the expansion slot.

d. Ensure that the system motherboard switches/jumper(s) are set properly for use with your Display Card.

e. Ensure that no other switch settings on the motherboard have been accidentally changed. Refer to the documentation provided with your computer to determine the correct switch settings.

If checking these items does not locate the problem, there may be a malfunction of the computer system, display monitor or the Display Card. Please see Service Information on the next page on how to return a defective Display Card for repair or replacement.

Service Information

If your product needs repair, return it to the Dealer from whom it was purchased.

If the repair is required during the warranty period, enclose proof of purchase with the returned product. During the warranty period, your product will be repaired or replaced without charge.

If the repair is required after the warranty period, there will be a service charge. Contact your Dealer for the repair prices of any out of warranty product.

To return your product for service, package the product securely and mail it **post-paid.** Your Dealer or the Manufacturer will not be responsible for damage due to shipping.

Remember to enclose your proof of purchase and a brief description of the problem to your Dealer.

Limited Warranty

The Manufacturer warrants to the original purchaser of this product that it shall be free of defects resulting from faulty manufacture or components for a period of **one (1) year** from the date of sale. Defects covered by this Limited Warranty shall be corrected either by repair or, at the Manufacturer's election, by replacement. In the event of replacement, the replacement unit will be warranted for the remainder of the original one (1) year period or thirty (30) days, whichever is longer. THERE ARE NO OTHER ORAL OR WRITTEN WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THOSE OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY IMPLIED WARRANTIES ARE LIMITED IN DURATION TO ONE (1) YEAR FROM THE DATE OF SALE. This Limited Warranty is non-transferable and does not apply if the product has been damaged by accident, abuse, misuse, modification, misapplication, shipment to the Manufacturer or service by someone other than the Manufacturer. Transportation charges to the Manufacturer are not covered by this Limited Warranty. To be eligible for warranty service, a defective product must be sent to and received by the Manufacturer within fifteen (15) months of the date of sale and be accompanied by a copy of the sales receipt. The Manufacturer does not warrant that this product will meet your requirements; it is your sole responsibility to determine the suitability of this product for your purposes.

THE MANUFACTURER'S SOLE OBLIGATION AND LIABILITY UNDER THIS WARRANTY IS LIMITED TO THE REPAIR OR REPLACEMENT OF A DEFECTIVE PRODUCT. THE MANUFACTURER SHALL NOT, IN ANY EVENT, BE LIABLE TO THE PURCHASER OR ANY THIRD PARTY FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, DAMAGES RESULTING FROM INTERRUPTION OF SERVICE AND LOSS OF BUSINESS) OR LIABILITY IN TORT RELATING TO THIS PRODUCT OR RESULTING FROM ITS USE OR POSSESSION.

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